Update on the CDF beamwidth measurement

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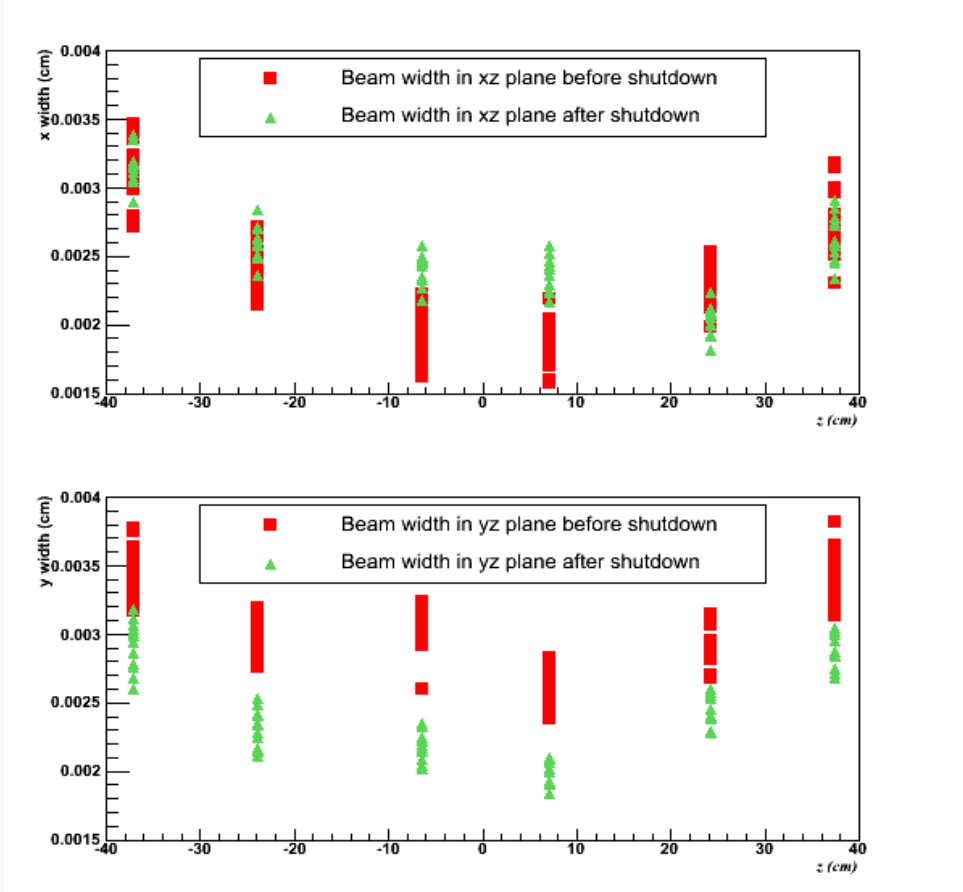
Outline

- Review
- Offline measurement
- History plot
- Summary

Review

- Measured online beam widths in x were seen odd & flat in post-shutdown data.
- Beam width in y were lower down than before..
- Use offline method to confirm beam width changes.

pre-shutdown vs. post-shutdown



Online method only.

Offline measurement

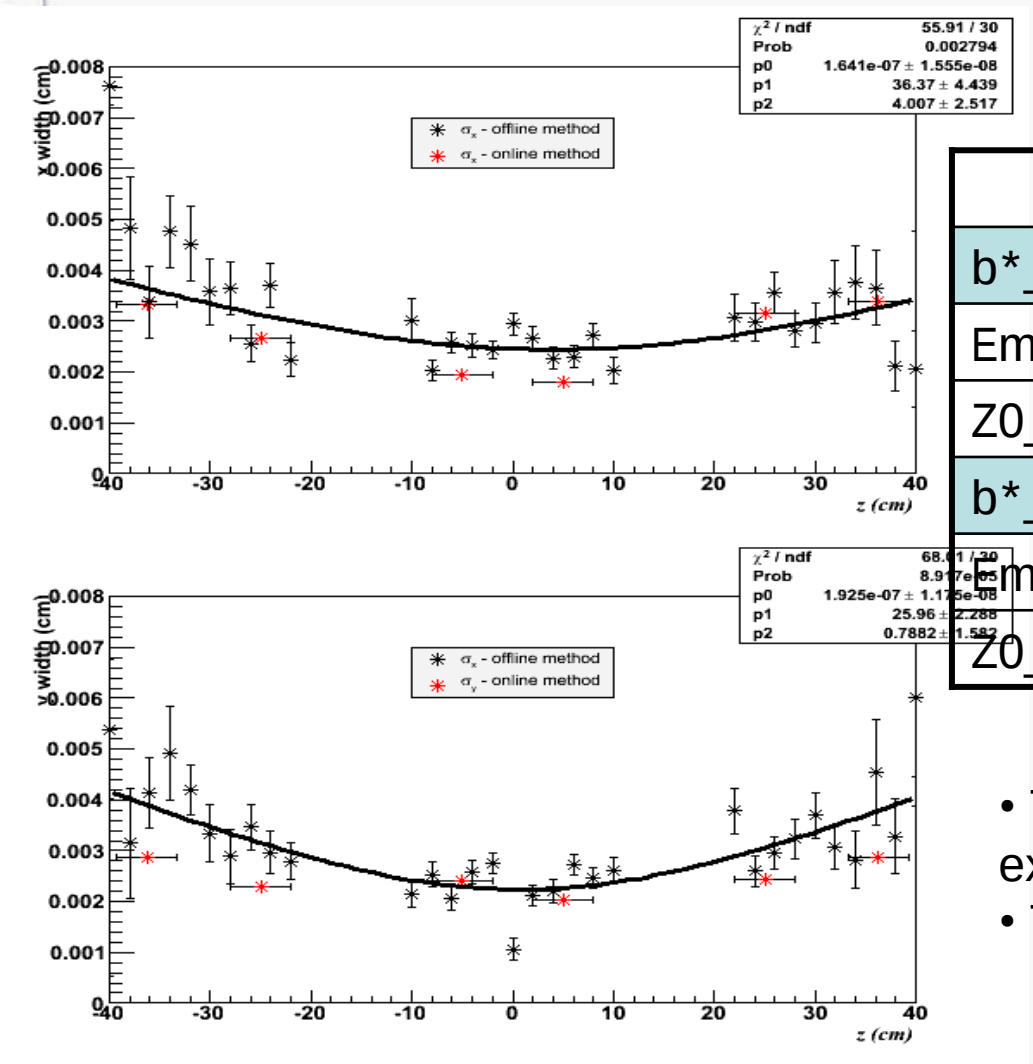
- The offline method is a beam width measurement using primary vertices in fully reconstructed data.

$$\sigma\_beam = sqrt(\sigma^2\_observed - \kappa^2*<\sigma^2\_pvtx>)$$
$$= sqrt(\varepsilon(\beta^*+(z-z0)^2/\beta^*))$$

, where κ is a scale factor to the measurement uncertainty.

- In CDF side - Post-shutdown data production is delayed due to new calibration.
- A few runs are produced only for beam width measurement by special request.
  - Which means smaller statistics in offline measurement.
  - Which means large error bar..

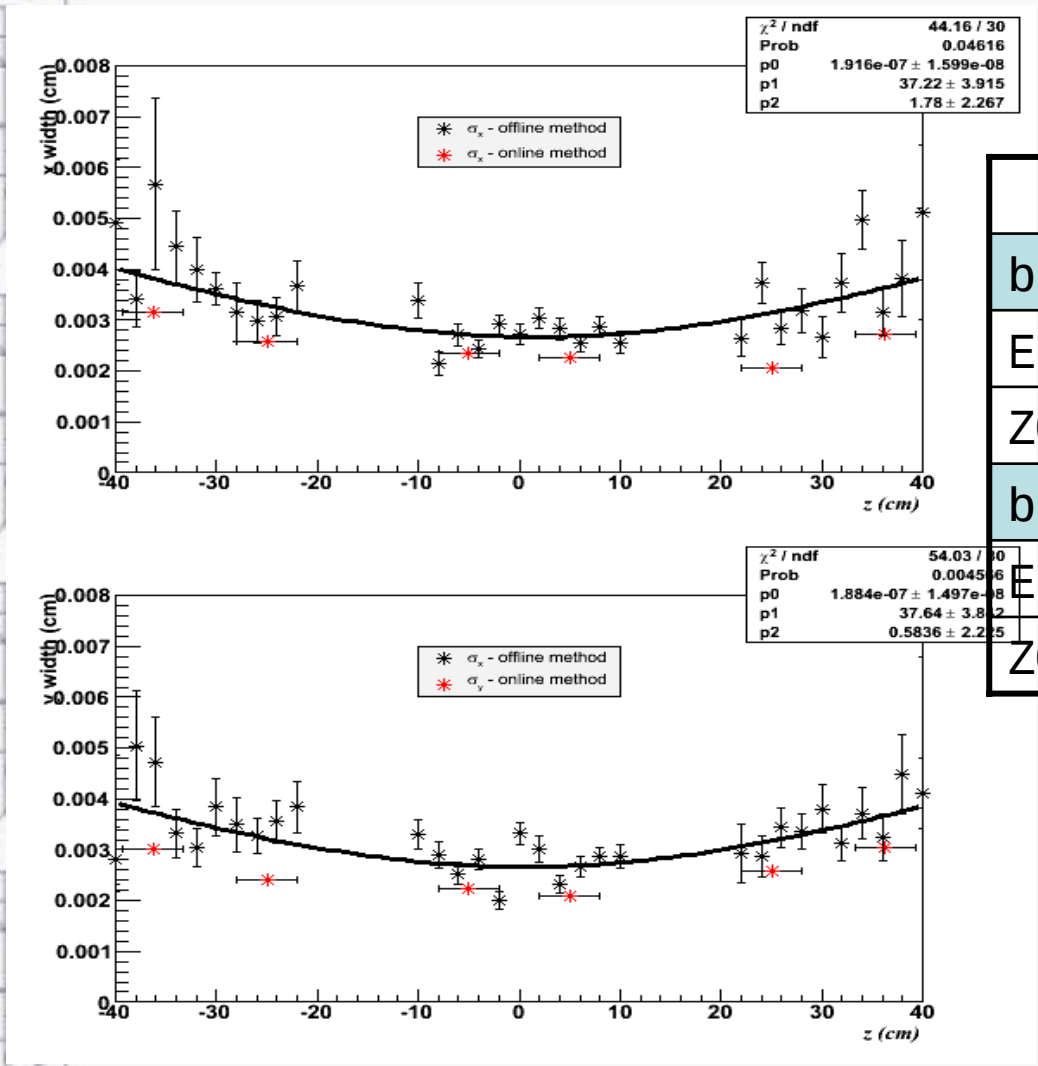
Online vs. Offline, store 4781



	Offline	Online
b*_x	36.4±4.4	19.65±3.0
Emit_x	1.6e-7±3e-8	1.4e-7±1e-9
Z0_x	4.0±2.5	-1.7±1.6
b*_y	26.0±2.3	34.9±4.7
Emit_y	1.9e-7±1e-8	1.1e-7±7e-9
Z0_y	0.79±1.6	-1.0±2.0

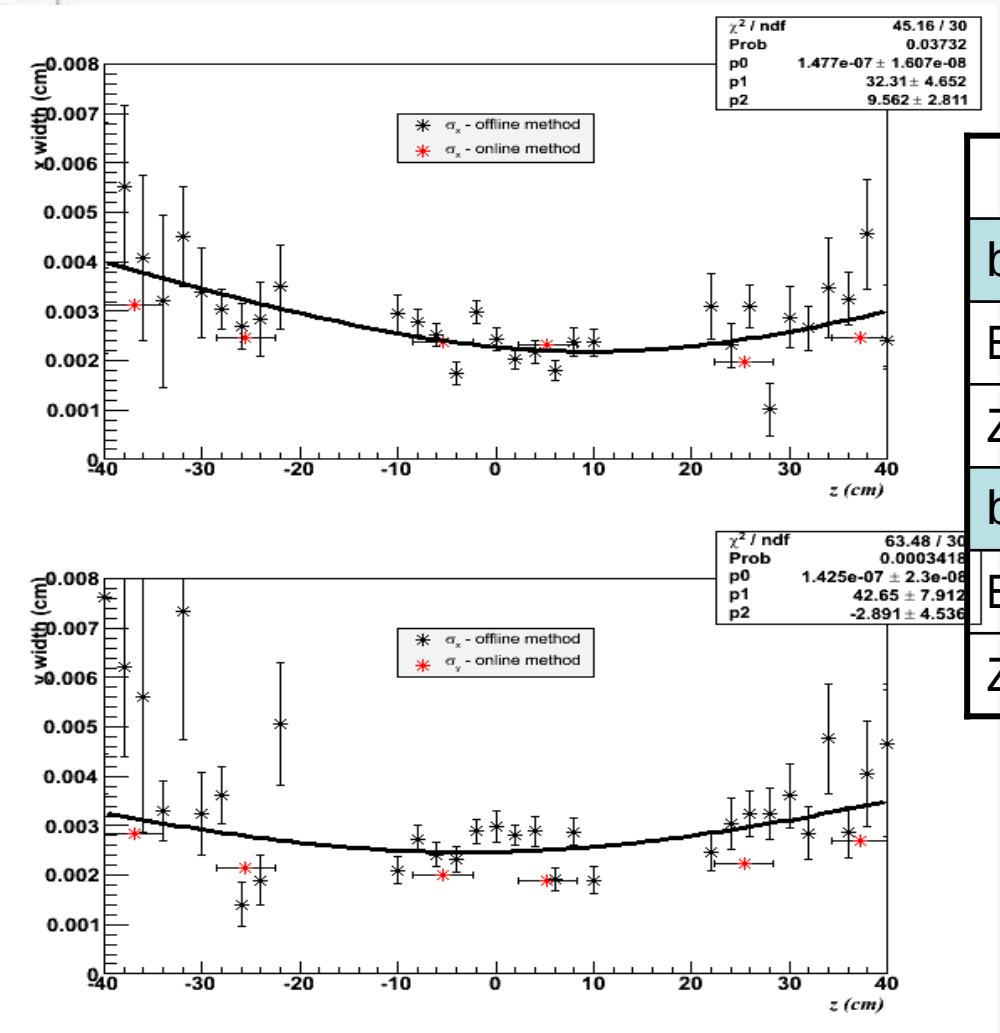
- The online beta* in this store is exceptionally small.
- This store was taken on Jun 19th.

Online vs. Offline, store 4847



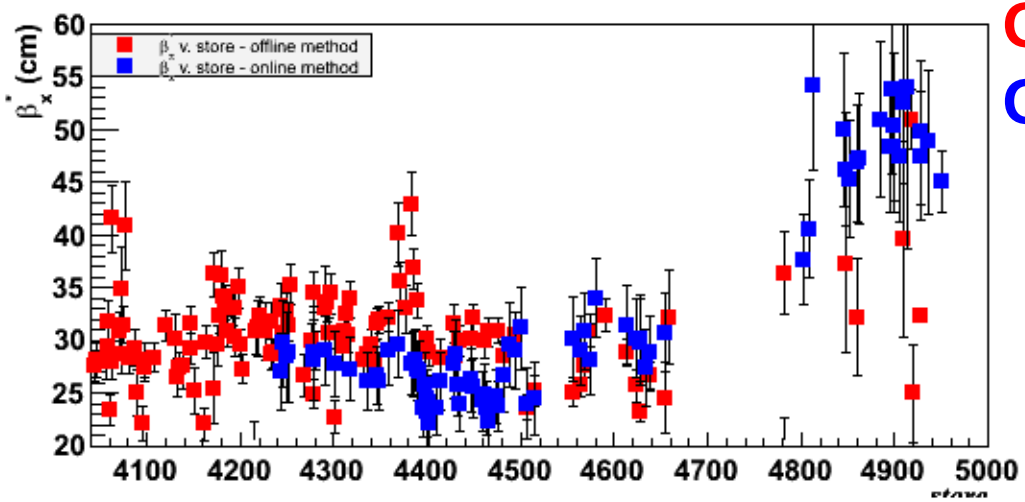
	Offline	Online
b*_x	37.22±3.9	46.23±5.4
Emit_x	1.9e-7±2e-8	1.1e-7±9.e-9
Z0_x	1.78±2.3	11.14±3.1
b*_y	37.6±3.8	32.7±4.1
Emit_y	1.9e-7±1e-8	1.3e-7±8e-9
Z0_y	0.58±2.2	0.61±1.9

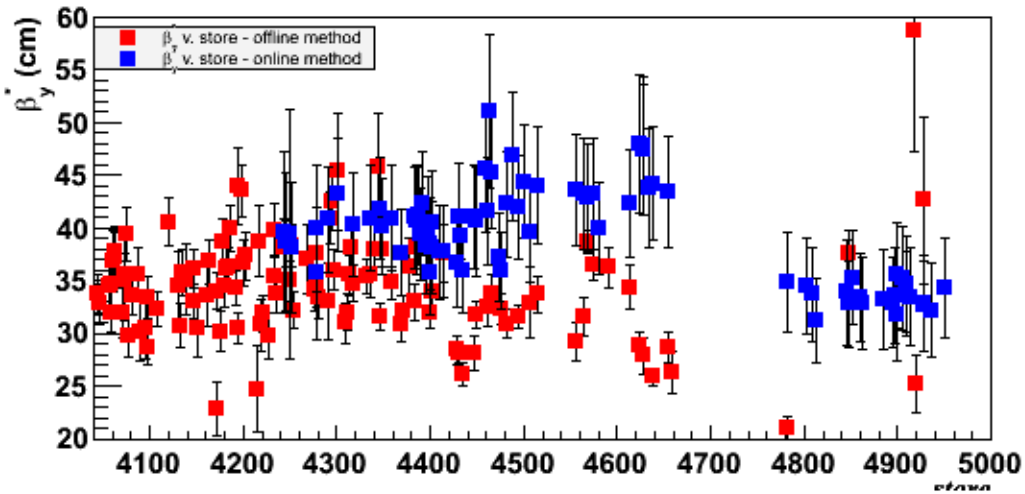
Online vs. Offline, store 4927



	Offline	Online
b*_x	32.3±4.7	47.4±6.1
Emit_x	1.5e-7±2e-8	9.3e-8±8.e-9
Z0_x	9.6±2.8	12.63±3.5
b*_y	42.6±7.9	32.63±4.3
Emit_y	1.4e-7±2e-8	1e-7±6.3e-9
Z0_y	-2.9±4.5	0.37±2.1

History plot for beta*



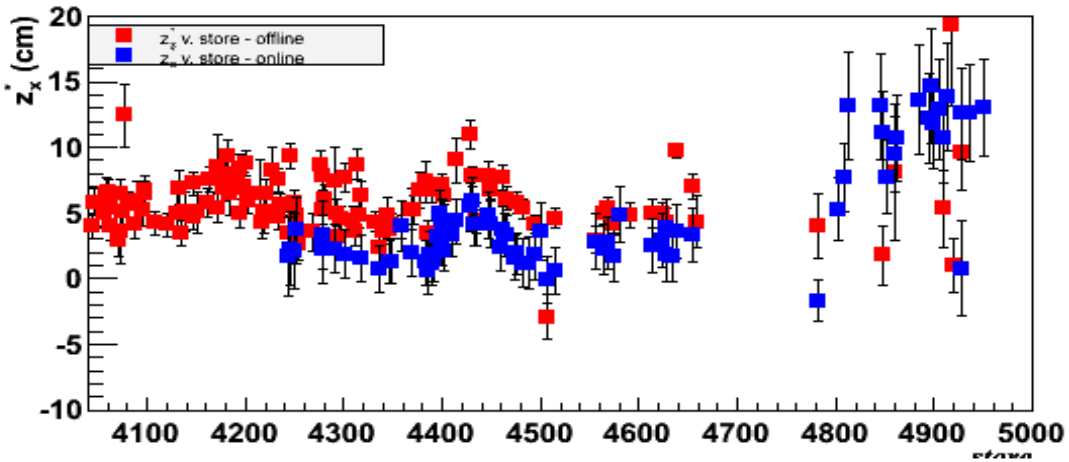


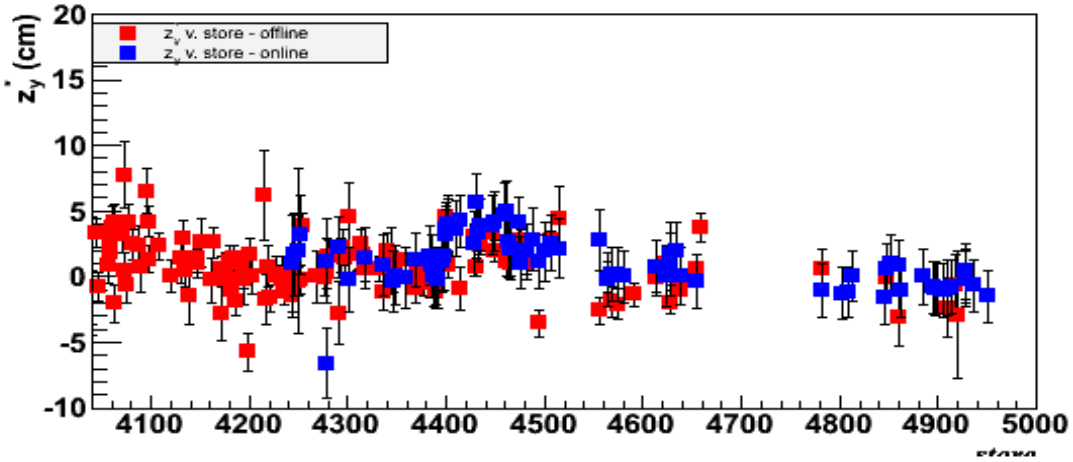
Offline Store up to ~4927

Online Store up to ~4950

- It is hard to compare beta* between the offline and online result in post shutdown data..
- Unfortunately the offline measurement was restricted by the statistics more than expected.
- We will have full production data in Oct. We will look at offline measurement again with it.

History for z0

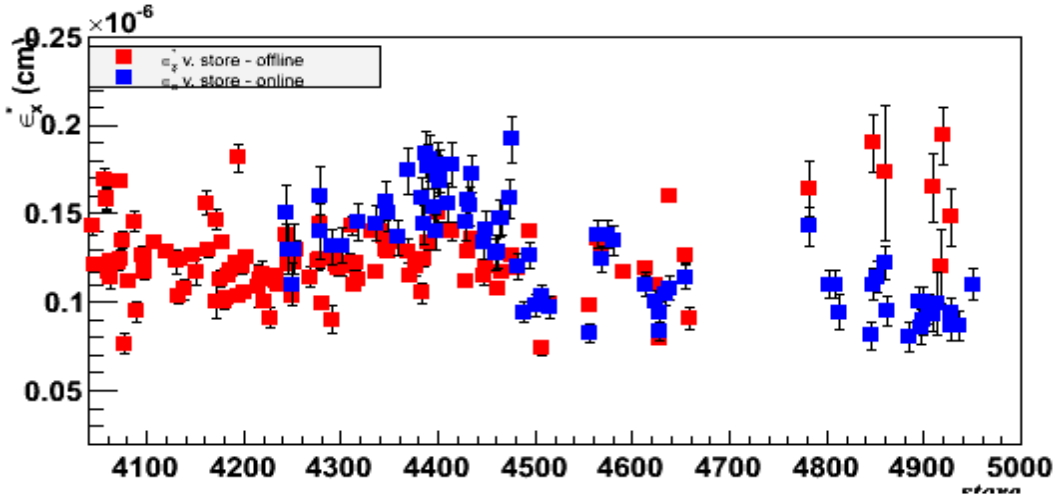


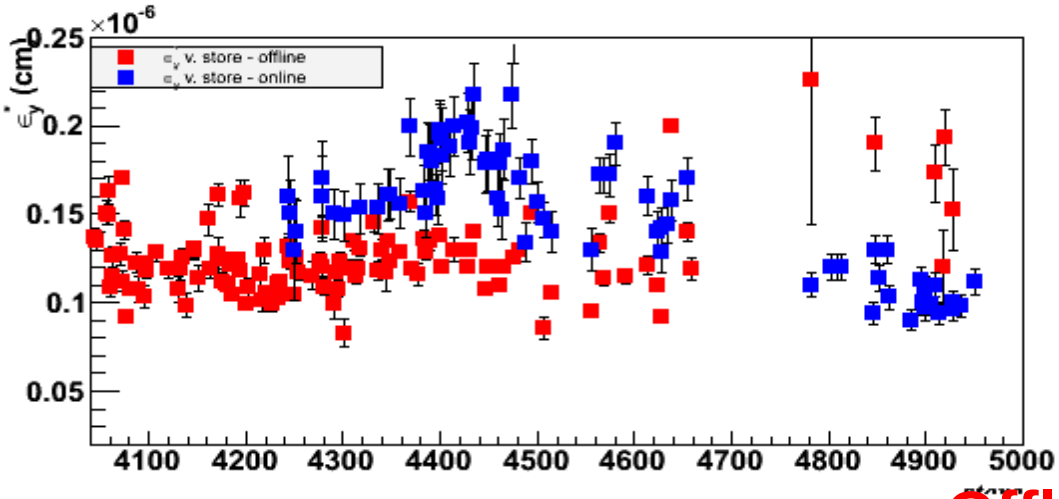


Offline Store up to ~4927

Online Store up to ~4950

History for emittance





Offline Store up to ~4927

Online Store up to ~4950

Summary

- The measured online beam width is still not understood and the weird feature in x has not gone away.
- Full production file will be available in ~ 1 month. Then, will run offline method with more statistics.
- What to do next..
  - Why barrel 4 in x is outlier?
  - Can we reproduce this with Monte Carlo?
  - Effect of new beam line and slope?
  - Make complete document.